

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report Nos. 50-315/93019(DRP); 50-316/93019(DRP)

Docket Nos. 50-315; 50-316

License Nos. DPR-58; DPR-74

Licensee: Indiana Michigan Power Company  
1 Riverside Plaza  
Columbus, OH 43216

Facility Name: Donald C. Cook Nuclear Power Plant, Units 1 and 2

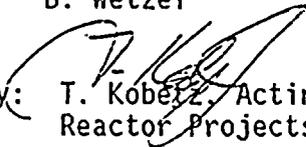
Inspection At: Donald C. Cook Site, Bridgman, MI

Inspection Conducted: September 11 through October 19, 1993

Inspectors: J. A. Isom

D. J. Hartland

B. Wetzel

Approved By:  T. Kobetz, Acting Chief  
Reactor Projects Section 2A

11/1/95  
Date

Inspection Summary: Inspection from September 11 through October 19, 1993  
(Report Nos. 50-315/93019(DRP); 50-316/93019(DRP))

Areas Inspected: Routine, unannounced inspection by the resident and Headquarters inspectors of: plant operations; maintenance and surveillance; engineering and technical support; actions on previously identified items; reportable events; and, NRC Region III requests.

Results: Two violations were identified (paragraphs 5.d and 5.e) for which no Notice of Violation is being issued based on conformance to criteria for exercise of discretion contained in the NRC Enforcement Policy.

Operations: Overall, performance in this area was good. However, the monitoring of equipment/system parameters in the plant by the auxiliary operators was found to be informal in that they were not required to take data on operating systems.

Engineering/Technical Support: The investigation into problems with the auxiliary feed pump bearing oil was good.

Safety Assessment/Quality Verification: Overall, the licensee's root cause evaluation and corrective actions for open items closed during this inspection period was satisfactory.

## DETAILS

### 1. Persons Contacted:

- \*A. A. Blind, Plant Manager
- \*K. R. Baker, Assistant Plant Manager-Production
- L. S. Gibson, Assistant Plant Manager-Projects
- \*J. E. Rutkowski, Assistant Plant Manager-Technical Support
- B. A. Svensson, Executive Staff Assistant
- \*T. P. Beilman, Maintenance Superintendent
- P. F. Carteaux, Training Superintendent
- D. L. Noble, Radiation Protection Superintendent
- L. J. Matthias, Administrative Superintendent
- T. K. Postlewait, Design Changes Superintendent
- S. A. Richardson, Operations Superintendent
- P. G. Schoepf, Project Engineering Superintendent
- \*J. S. Wiebe, Safety & Assessment Superintendent
- L. H. Vanginoven, Site Design Superintendent
- \*G. A. Weber, Plant Engineering Superintendent
- \*D. C. Loope, Chemistry Superintendent
- M. L. Horvath, Quality Assurance Supervisor

The inspector also contacted a number of other licensee and contract employees and informally interviewed operations, maintenance, and technical personnel.

\*Denotes some of the personnel attending the Management Interview on October 25, 1993.

### 2. Plant Operations (71707, 71710, 42700):

The inspector observed routine facility operating activities as conducted in the plant and from the main control rooms. The inspector monitored the performance of licensed Reactor Operators and Senior Reactor Operators, of Shift Technical Advisors, and of Auxiliary Equipment Operators including procedure use and adherence, records and logs, communications, and the degree of professionalism of control room activities.

The inspector reviewed the licensee's evaluation of corrective action and response to off-normal conditions. This included compliance with any reporting requirements.

The inspector noted the following with regard to the operation of Units 1 and 2 during this reporting period:

#### a. Unit 1 status:

The licensee operated the unit at full power during the inspection period except between September 10-14, 1993, when the licensee

reduced power to 55 percent to perform a Clamrol treatment of its lake water systems for zebra mussel infestation. The licensee did not experience any significant operational problems during the inspection period.

b. Unit 2 status:

The licensee operated the unit at 75 percent power during the inspection period except between September 10-14, 1993, when the licensee reduced power to 55 percent to perform a Clamrol treatment of its lake water systems for zebra mussel infestation. The licensee did not experience any significant operational problems during the inspection period.

c. Auxiliary Equipment Operator Plant Tours:

The inspector accompanied several auxiliary equipment operators (AEOs) for both units during the performance of shiftly plant tours, which are prescribed by 01 & 02-OHP 5030.001.001, "Plant Tour Guidelines." The procedure is a guide for the AEOs on the performance of equipment checks and what types of plant conditions are considered normal and should be expected during their plant tours. In addition to the tour guidelines, the operators take some local readings for input into 01 & 02-OHP 4030.STP.030, "Daily and Shiftly Surveillance Checks," such as containment sump run time meter readings and battery room temperatures.

The inspector noted a weakness with the "Plant Tour Guidelines" procedure. The procedure does not contain data sheets with entries for logging local plant readings, therefore the AEO's plant tours can potentially miss components that are prescribed to be monitored by the guidelines. This was discussed with plant management. They had been reluctant to implement data sheets for plant tours because they do not want to limit the items that the AEOs look at during their tours. They want the AEOs to maintain a questioning attitude about all plant equipment rather than confining them to looking at specific gauges for logging data points. Therefore, they have implemented the guidance for plant tours and expect the AEOs to become familiar with all the equipment on their tours and be aware of any changing conditions and potentially degraded equipment.

Licensee management was already aware of the potential weaknesses with the AEO tours and are considering plans to upgrade them. They are investigating the use of computer pads for the AEOs, which would allow them to take data points off of local gauges and produce immediate trends of various parameters on plant equipment. System engineers are currently reviewing the "Plant Tour Guidelines" procedure and to determine what types of parameters the AEOs should log for various components.



No violations, deviations, unresolved or inspector followup items were identified.

3. Maintenance/Surveillance (62703, 61726, 42700):

The inspector reviewed maintenance activities as detailed below. The focus of the inspection was to assure the maintenance activities were conducted in accordance with approved procedures, regulatory guides and industry codes or standards, and in conformance with Technical Specifications. The following items were considered during this review: the Limiting Conditions for Operation were met while components or systems were removed from service; approvals were obtained prior to initiating the work; activities were accomplished using approved procedures; and post maintenance testing was performed as applicable.

The following activities were inspected:

a. Unit 1 Turbine-driven Auxiliary Feedwater (TDAFW) Pump Turbine Bearing Oil Level:

The inspector reviewed licensee actions in response to a problem encountered with the Unit 1 TDAFW pump turbine bearing oil system. The inspector determined that the licensee's root cause investigation and corrective action to the problem were good.

On October 5, 1993, the licensee removed the pump from service for planned maintenance, which included change-out of the turbine bearing oil. The following day, while running the pump for post-maintenance testing, licensee personnel observed that the oil level had fallen below the minimum level indicated in the sight glass and that oil was leaking out of the outboard bearing housing.

After discussions with the pump vendor and further troubleshooting activities, the licensee determined that the draw-down of the oil level was due to absorption by the system, which was expected during initial pump startup after the oil change. The licensee also determined that the leakage out of the outboard bearing was due to the overfilling of the system.

As corrective action, the licensee lowered the maximum level indication on the sight glass to prevent overfilling the system in the future. The licensee was evaluating enhancement to the applicable plant instruction to ensure that the system is properly vented when filling.

b. Surveillances observed:

The inspector observed the following surveillances and noted no deficiencies:



"Unit 2 Essential Service Water High Differential Pressure Motor Operator Valve Testing," \*\*02-OHP.SP.106.

"Turbine Driven Auxiliary Feed Pump Trip and Throttle Valve Operability Test," 2-OHP 4030.STP.017TV..

No violations, deviations, unresolved or inspector followup items were identified.

4. Engineering and Technical Support (37828):

The inspector monitored engineering and technical support activities at the site and, on occasion, as provided to the site from the corporate office. The purpose of this monitoring was to assess the adequacy of these functions in contributing properly to other functions such as operations, maintenance, testing, training, fire protection and configuration management.

a. Empty Unit 2 Auxiliary Feedwater (AFW) Pump Oil Bubbler:

On October 2, 1993, the inspector accompanied the AFW system engineer to determine the quantity of oil which could be removed from the turbine-driven auxiliary feedwater (TDAFW) pump outer bearing before oil lubrication using the slinger ring would be lost. The test was performed using the spare TDAFW pump to determine whether the low oil condition found by NRC inspectors on September 2, 1993, was a situation in which no oil was available for lubrication of the outboard bearings (see paragraph 2d of 50-315/93018(DRP);50-316/93018(DRP)).

The system engineer's discussion with the vendor indicated that lubrication could still be provided to the bearings as long as the slinger ring was immersed in oil. The engineer determined that the bearing housing contains 360 milliliters of oil from the bottom of the bubbler assembly to a level below the slinger ring. Therefore, based on the 320 milliliters it took to refill the bearing housing to the bottom of the bubbler assembly on September 2, it appeared that there was about 40 milliliters available to provide lubrication to the bearings. This showed that the oil level was not found so low as to render the AFW pump inoperable.

b. Unit 2 West Centrifugal Charging Pump:

The inspector examined the licensee's investigation into the failure of the Unit 2 "W" centrifugal charging pump (CCP) (50-315/93016(DRP); 50-316/93016(DRP)) through reviews of various licensee documents and interviews with system engineers. The failed internal assembly was sent to Westinghouse for disassembly and inspection to determine the cause of the breakdown. The high vibrations on the pump were caused by a four inch, 180 degree circumferential crack through the number 9 impeller shaft keyway.

Westinghouse also reported 2 minor cracks on the number 3 and number 8 impeller shaft keyways. A metallurgical analysis of the shaft is still in progress. Westinghouse personnel believe that excessive radial loadings were applied to the keyways. System engineers are continuing to perform a root cause determination by reviewing the pump operating history. The inspector will continue to follow the licensee's determination of the root cause of the pump failure and the corrective actions taken, as appropriate.

c. Unit 1 East Centrifugal Charging Pump:

While performing predictive maintenance activities, the licensee identified an increasing trend on the Unit 1 "E" CCP outboard bearing vibration. Although this bearing was not required to be monitored by the licensee's IST program, this condition could have been symptomatic of a problem with the pump which could result in pump failure. The inspector reviewed licensee activities in response to this condition and determined that they were satisfactory.

The licensee responded to this increasing trend in vibration by increasing the surveillance frequency of bearing vibration measurement from quarterly to biweekly. In addition, the licensee installed temporary instrumentation to measure the phase angle of the shaft. A shift in the phase angle would have been indicative of a circumferential crack propagating in the shaft. No such phase angle shift was observed.

The licensee also took the pump out of service on October 4, 1993, to perform a hot alignment check of the pump and motor shafts, and to check the tightness of the base plate and foundation bolts. The licensee did not identify any deficiencies associated with this work activity. At the end of the inspection period, the vibration levels on the bearing had begun to trend downward and were steady, although still considered in the "rough" range. The inspector will continue to follow the licensee's investigation into the bearing vibration problem.

No violations, deviations, unresolved or inspector followup items were identified.

5. Actions on Previously Identified Items (92701, 92702):

a. (Closed) IFI 50-315/92016-01; 50-316/92016-01: Licensee Evaluation of Age Degradation of Expansion Joints

This IFI involved a concern related to failure of safety-related expansion joints in the plant due to age degradation.

The licensee identified a total of eight safety-related expansion joints in the plant. All were installed in emergency diesel generator (EDG) support systems (essential service water cooling

water supply and combustion air supply). Two of the joints had been installed since 1990. The licensee was not able to determine when the other six joints were installed. In response, the licensee contracted a vendor to inspect the joints. Based on the vendor's recommendations, the licensee determined that none of the joints required immediate replacement. However, the licensee generated action requests to replace the six joints during the 1994 refueling outages. In addition, the licensee committed to revise their preventive maintenance program to require replacement of the safety-related joints on a 7-1/2 year interval.

b. (Closed) Violation 316/92022-01: Failure to Maintain Both EDG's Operable

(Closed) Violation 316/92022-02: Failure to Include Acceptance Criteria For EDG's

(Closed) Violation 316/92022-03: Failure to Promptly Identify and Correct Unit 2 "AB" EDG Leak

These violations were issued in response to the Unit 2 "AB" EDG inoperability event on September 28, 1992. On that date, the EDG tripped on low lube oil pressure due to insufficient oil inventory in the EDG lube oil tank. A detailed investigation into the event, as documented in IR Nos. 50-315/92022(DRP); 50-316/92022(DRP), established that the EDG was inoperable for a period of time in excess of that allowed by TS.

The inspector identified several root causes for the event. The surveillance procedure that monitored the EDG lube oil level on a weekly basis did not contain any minimum acceptance criteria. As long-term corrective action to this concern, the licensee performed a review of the applicable tour procedures to verify that appropriate critical parameters were monitored during the AEO tours. The licensee revised the procedures to include acceptance criteria and trending methods for the parameters. In addition, the licensee was currently developing a computerized system for providing input and processing the parameters taken on AEO tours, which will provide a more formalized system for monitoring the parameters. The licensee expected to implement this system by the end of 1993.

Another root cause for the event was the licensee's failure to take action to repair the leak which resulted in the loss of the lube oil inventory. The licensee initiated a work request to repair the leak several months prior to the event, but the request did not quantify the leak, and the licensee assigned the request a low work priority without periodically re-evaluating the significance of the leak. In response to this concern, the licensee enhanced the work request review process by requiring a more detailed description of deficiencies on work requests. The licensee also established a work classification organization

within the scheduling department, consisting of three licensed operators, to review work requests for detail and assign the appropriate priority and schedule date. The licensee also added a requirement for system engineers to periodically review work requests associated with their assigned systems.

Contributing factors to the event were an inaccurate level indication and the failure of the low level alarm to actuate. In response, the licensee was performing weekly dip measurements of the lube oil tank levels. In addition, the licensee verified proper operation of each EDG lube oil level alarm and will increase the frequency of the level alarm operational checks from once every four years to every refueling outage.

c. (Closed) Unresolved Item 315/93011-05: CCW Flow to Emergency Core Cooling System Heat Exchangers

During walkdown of the Component Cooling Water (CCW) system, the inspector found that there were no installed flow instruments which could be used to verify flow to the individual heat exchangers (which are in parallel) for the safety-related charging pumps. At the time, the inspector was concerned that the licensee would not be able to ensure that each of the heat exchangers was receiving adequate design flow and that the licensee would not be able to detect degradation in heat exchanger performance.

Each safety-related charging pump is designed with four heat exchangers which provide cooling to the pump's bearing oil, gear oil and the two mechanical seals. The two mechanical seal heat exchangers are in-series and, therefore, are effectively one heat exchanger. One flow instrument is provided at the CCW return header from these heat exchangers to measure total combined CCW flow.

The inspector reviewed the instrumentation and annunciators associated with the charging pump system and found that the control room operators would not be able to determine whether there was a degradation in heat exchanger performance because they did not have annunciators which could alarm to alert them of degrading heat exchanger performance. One annunciator, "East(West) Lube Oil Temp Or Press Low" (drop 13 on annunciator panel number 209) alarms on decreasing lube oil temperature or decreasing oil pressure. It appeared that this alarm was installed to detect excessive CCW flow being provided and to detect for low oil conditions. Additionally, only the bearing oil cooler had a temperature gauge which could be used to monitor heat exchanger performance.

The inspector reviewed the licensee's flow curves and determined that if the heat exchangers performed as designed, there should be adequate flow distribution between the three heat exchanger sets. There have been no adverse pump performance problems resulting

from lack of CCW cooling being provided to the charging pumps. Additionally, the CCW system is a closed system such that potential fouling of the heat exchangers appeared unlikely during normal routine operations.

- d. (Closed) Unresolved Item 50-315/92009-01; LER 50-315/92006:  
Failure of Main Steam Safety Valves to Meet Technical  
Specification Lift Setpoint Requirements Due to Setpoint Drift

Historically, the licensee has had problems meeting the Technical Specification (TS) lift requirement for their steam generator safety valves. Although this problem has been uncorrected for some time, it appeared that this was a generic industry problem. Since then, the licensee has performed further calculations and analysis to allow a TS change request to increase the lift setpoint tolerance from 1 to 3 percent. The inspector's discussion with the NRR project manager indicated that this TS change request, AEP:NRC:1169, dated November 11, 1992, was reviewed by the NRR technical section and was found to be acceptable. The TS change should minimize or possibly eliminate the inability for the safety valves to meet their lift setpoint requirements. Additionally, the licensee will perform refurbishment for safety valves which are found to exceed the plus or minus 3 percent requirement.

This problem involved a failure to prevent repetition of a condition prohibited by the TS. However, the problem had minimal safety significance because the licensee analysis (based on the new Westinghouse analysis) showed that safety limits were not exceeded for either loss of load/turbine trip or small break loss-of-coolant scenarios. In addition, the licensee properly reported the event and took appropriate corrective actions. Therefore, pursuant to the NRC enforcement policy (10 CFR 2, Appendix C), the NRC is exercising enforcement discretion for this matter, and no Notice of Violation will be issued.

- e. (Closed) Unresolved Item 50-315/92014-01; LER 50-315/92009-LL:  
Failure of Two Pressurizer Safety Valves to Meet Technical  
Specification Lift Setpoint Requirements

The licensee has experienced problems with failure of the pressurizer safety valves to lift within the required pressures in the Technical Specifications (TS). LERs, 50-315/90016-LL for Unit 1 and 50-316/92006-LL and 50-316/89-04 for Unit 2 dealt with the same problem. Although the problem of safety valve setpoint drift caused a repeated TS violation, the licensee's complete disassembly and inspection of the failed valves found no cause for the setpoint drift. Also, the licensee's evaluation has found that there was no safety significance from the setpoint drift since, in the event of an overpressure transient, the safety valves would still have limited the peak transient pressure to



2659 psig. This is below the TS safety limit of 2735 psig. In addition, the licensee properly reported the event and took appropriate corrective actions. Therefore, pursuant to the NRC enforcement policy (10 CFR 2, Appendix C), the NRC is exercising enforcement discretion for this matter, and no Notice of Violation will be issued.

Two non-cited violations were identified. No deviations, unresolved or inspector followup items were identified.

6. Reportable Events (92700, 92720):

The inspector reviewed the following Licensee Event Reports (LERs) by means of direct observation, discussions with licensee personnel, and review of records. The review addressed compliance to reporting requirements and, as applicable, that immediate corrective action and appropriate action to prevent recurrence had been accomplished.

(Closed) LER 315/92010-LL: Missed Surveillance Due to the Use of Obsolete Documentation in Support of Thermo-Lag 330 Inspection:

The licensee submitted this LER because they had determined that a section of Thermo-Lag 330 which enclosed a conduit in the Unit 2 blowdown-flash tank area had not been included in the surveillance program for fire barriers as required by Technical Specification 3/4.7.10. However, further review by the licensee found that this particular conduit did not need to have this fire barrier protection. Two modifications (12-2900-B.04 and 12-3053) had provided redundant indications which were routed through different fire zones. Therefore, the licensee determined that they had not violated the TS requirements and retracted LER 50-315/92010.

No violations, deviations, unresolved or inspector followup items were identified.

7. Region III Requests (92705):

TI 2500/028: Employee Concerns Program:

The objective of this TI was to determine the characteristics of the licensee's program to provide employees an alternate path from their supervisor or normal line management to express safety concerns. Additionally, this type of program would encourage people to come forward with their concerns without fear of retribution. The inspector noted that the licensee had just recently implemented the program that met this objective; therefore, the inspector was unable to determine the effectiveness of the program at this time.

The licensee implemented their Human Performance Improvement System (HPIS) in March 1993. The licensee designed the program to supplement and build upon the current plant corrective action program by proactively identifying precursor events which are indicative of

potentially significant problems. The licensee modeled the program after the INPO HPES program and provided an alternate vehicle for plant personnel to raise safety issues. The Human Performance Analyst (HPA), reporting directly to the Safety and Assessment Manager, manages the program.

Plant personnel report potential safety issues by filling out forms located throughout the plant or calling the in-plant "Human Performance Hot-Line." Personnel may provide anonymous reports, and also may keep their identity from being revealed, if requested. The HPA was currently conducting meetings with plant personnel to inform them of the program, and enhancements to the program were also reported by bulletin board postings and in the plant newsletter. To provide an incentive for reporting issues, the licensee publicly recognized individuals who made significant contributions on bulletin board postings. The licensee was also considering awards for future incentive.

The HPA followed up on issues identified with help from cognizant plant personnel, as needed. The licensee was currently developing procedural guidelines for evaluating and trending the issues identified. In addition, the licensee had not yet established specific goals to measure the effectiveness of the program.

No violations, deviations, unresolved or inspector followup items were identified.

8. Management Interview:

The inspectors met with licensee representatives denoted in paragraph 1 on October 25, 1993, to discuss the scope and findings of the inspection. In addition, the inspector also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. The licensee did not identify any such documents or processes as proprietary.

